

### **REMARKS**

Claims 1-9 were originally filed in this application. Claims 1-9 were previously canceled without prejudice or disclaimer, and claims 10-36 were previously added. Claims 10, 12, 15, 18-20, 22, 24, 26, 27, 29, 30, 32, 35, and 36 are currently amended. Support for the amendments to claims 10, 12, 15, 18, 19, 22, 24, 26, 29, 30, 32, 35, and 36 is provided in, for example, paragraph [0027] of the application as published (U.S. Patent Pub. No. 2006/0000774 A1). Support for the amendment to claims 20 is provided in, for example, paragraph [0029] and FIG. 2 of the application as published. Support for the amendment to claim 27 is provided in, for example, FIG. 1 of the application as published. No claims are currently added or canceled. As a result, claims 10-13 and 15-36 are pending for examination with claims 10, 20, 22, and 27 being independent claims. No new matter has been added.

#### **Rejections Under 35 U.S.C. § 103**

Claims 10-13 and 15-36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Cote et al., U.S. Patent No. 5,607,593 (hereinafter "Cote") in view of Miyashita et al., U.S. Patent No. 6,280,626 B1 (hereinafter "Miyashita"), and further in view of Ide, JP2277528 (hereinafter "Ide").

Claims 10-13 and 15-36 are not obvious over Cote in view of Miyashita and further in view of Ide. No *prima facie* case of obviousness of these claims over Cote in view of Miyashita and further in view of Ide can be made. No alleged combination of Cote with Miyashita and Ide could have taught each and every element of claims 10-13 and 15-34. Further, Cote, Miyashita, and Ide could not have been validly combined *ab initio*.

There is no aeration hood as recited in any of claims 10-13 or 15-36 disclosed in any of Cote, Miyashita, or Ide. Nor is there any structure equivalent to an aeration hood disclosed in any of Cote, Miyashita, or Ide. None of Cote, Miyashita, or Ide contemplate or appreciate the benefit of an aeration hood which functions according to embodiments of the present invention. None of Cote, Miyashita, or Ide contemplate or disclose any structure within a feed tank surrounding one or more filtration modules which would

permit a liquid level of a feed liquid enclosed therein to be lowered by introducing a gas into the structure. In fact, as is discussed below, inclusion of such a structure in the filtration devices of Cote or Miyashita would be counter to the operating principles or objectives of these devices. As such, no alleged combination of Cote, Miyashita, and Ide could disclose or suggest an aeration hood as recited in any of claims 10-13 or 15-36.

Cote does not disclose an aeration hood as recited in any of claims 10-13 or 15-36. This is acknowledged by the Examiner at paragraph five of the Office Action. Further, Cote does not disclose open-ended tubes or sleeves surrounding membrane modules which extend downward from an upper wall of an aeration hood or open ended tubes including aeration inlets as recited in various of claims 10-13 and 15-36.

Miyashita does not disclose an aeration hood as recited in any of claims 10-13 or 15-36. Miyashita also does not disclose open-ended tubes or sleeves surrounding membrane modules which extend downward from an upper wall of an aeration hood or open ended tubes including aeration inlets as recited in various of claims 10-13 and 15-36.

Nor does Ide disclose an aeration hood as recited in any of claims 10-13 or 15-36, open-ended tubes or sleeves surrounding membrane modules which extend downward from an upper wall of an aeration hood, or open ended tubes including aeration inlets as recited in various of claims 10-13 and 15-36. Ide appears to disclose a hollow fiber module 1 mounted within a protective tube 4. The protective tube 4 is suspended from a tube plate 3. The protective tube 4 includes vent holes 18 proximate an upper end thereof. The hollow fiber membrane 1 and protective tube 4 are included within a vessel. In operation it appears that bubbles are introduced into the protective tube 4 from a bubbling air line 14. The bubbles pass through the protective tube 4 and out through the vent holes 18.

There is no *prima facie* case of obviousness of claims 10-13 and 15-36 over Cote in view of Miyashita and further in view of Ide. No alleged combination of these references can disclose, teach, or suggest each and every element of any of claims 10-13 or 15-36. No alleged combination of Cote with Miyashita and Ide could have resulted in or rendered obvious the filtration arrangement as claimed in any of independent claims 10, 20, 22, or 27.

The Examiner acknowledges that Cote does not disclose any aeration hood. Nor does Miyashita disclose any aeration hood, as is alleged by the Examiner. Miyashita does not disclose, teach, or suggest an aeration hood configured and arranged such that gas fed into the aeration hood will displace feed liquid and lower a level of feed liquid in the aeration hood, as recited in independent claims 10, 20, and 22. Miyashita does not disclose any upper wall or plate without passages therethrough connecting sidewalls of the structure of Miyashita as is asserted by the Examiner in paragraph 37d of the Office Action. The walls without passages that the Examiner points to (those of Miyashita FIGS. 2A and 26) are vertical side walls, not an upper wall. The horizontal plate disclosed in Miyashita at Col. 4, line 67 – Col. 5, line 1 cannot be an aeration hood upper wall as is asserted by the Examiner. Miyashita teaches against the use of a horizontal plate without flow passages by stating that any horizontal plate connecting the sidewalls 106a, 106b “**should** include flow passages therethrough so as to permit liquid to flow through the enclosure wall subassembly in a vertical direction” (Miyashita at Col. 5, lines 2-4, emphasis added). One of ordinary skill in the art upon reading that such a plate should include flow passages would not have been motivated to modify the plate so as to not contain flow passages. Mandatory teaching is not required for teaching away or non-obviousness – the test is whether a person would be led in a different direction, or discouraged from moving in a direction. See *Tec Air, inc. v. Denso Mfg, Mich. Inc.*, 192 F.3d 1353, 1360 (Fed. Cir 1999) citing *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) (“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant . . . [or] if it suggests that the line of development flowing from the reference’s disclosure is unlikely to be productive of the result sought by the applicant.”)

The plate of Miyashita could not be an upper wall of an aeration hood configured and arranged such that gas fed into the aeration hood will displace feed liquid and lower a level of feed liquid in the aeration hood. Any gas fed into the structure of Miyashita would escape through the “flow passages” in the plate, and thus could not displace feed liquid from within the structure. A plate such as that suggested in Miyashita cannot serve as an upper wall that allows displacement of feed liquid from within the aeration hood as

described in paragraphs 20 and 27 of the present specification and as claimed in independent claims 10, 20, and 22.

Even if the plate of Miyashita could somehow be connected to the sidewalls of Miyashita so as to form an aeration hood as recited in any of independent claims 10, 20, and 22 as asserted by the Examiner, this would render the filtration apparatus of Miyashita inoperable for its intended purpose. If gas fed into the aeration hood would displace feed liquid and lower a level of feed liquid therein, as recited in independent claims 10, 20, and 22, then the aeration hood would also prevent the flow of liquid or gas therethrough. Miyashita discloses that “[t]he enclosure wall structures are constructed and arranged . . . [to] permit the liquid to flow through the enclosure subassembly” (Miyashita at Col. 2, lines 17-21) and that “[g]as . . . fed into the diffuser . . . generates bubbles 104b, which reach the surfaces of the membrane modules 103 through the object liquid . . . before being discharged from the liquid surface to the atmosphere” (Miyashita at Col. 6, lines 35-42). If the plate of Miyashita was somehow modified to form an aeration hood as recited in any of independent claims 10, 20, or 22, the filtration assembly of Miyashita would not be capable of allowing liquid or air bubbles to pass through the module assembly as disclosed by Miyashita. Any bubbles entering the alleged aeration hood would remain trapped there and prevent liquid to be filtered from reaching the membrane modules, thus rendering the filtration assembly of Miyashita inoperable for its intended purpose. As such, one of ordinary skill in the art would not have been motivated to have modified Miyashita to include an aeration hood as asserted by the Examiner. See *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984) (finding no suggestion to modify a prior art device where the modification would render the device inoperable for its intended purpose.)

The Examiner’s addition of Ide to the alleged combination of Cote with Miyashita does nothing to render obvious an aeration hood as recited in independent claims 10, 20, 22, and 27. Drum 6 of Ide cannot be an aeration hood sidewall as alleged by the Examiner. Drum 6 of Ide cannot be an aeration hood sidewall as claimed in any of independent claims 10, 20, 22, or 27 because it is not “positioned within a feed tank” as recited in independent claims 10 and 22, immersed in feed liquid, as recited in

independent claim 22, or “submerged in water to be treated” as recited in independent claim 27.

In addition, no combination of Cote with Miyashita and Ide could render obvious the sheaths or open-ended tubes recited in any of claims 10-13 or 15-36. Sheaths 5, 5a of Cote do not comprise open-ended tubes extending downwardly from the upper wall of an aeration hood as recited in independent claims 10 and 22. Cote FIGS. 10 and 11 do not, as alleged by the Examiner, disclose “open-ended tube[s] descending downwardly.” These figures clearly show the sheaths joined to a wall on their bottom end, not extending downward from an upper wall. Ide does not disclose any open-ended tube or sheath within the filtration arrangements recited in any of independent claims 10, 20, 22, or 27 because Ide does not disclose any open-ended tube or sleeve surrounding a membrane module and distinct from any sidewall of an aeration hood. As noted above, Ide does not disclose any aeration hood as recited in these claims whatsoever, let alone an open-ended tube or sheath distinct from a wall of an aeration hood.

Open ended-tubes within an aeration hood are not disclosed in Miyashita FIG. 53 as is asserted by the Examiner in paragraph 37a of the Office Action. Rather, this figure illustrates a vertical plate located between sets of membrane modules surrounded by walls 306 which the Examiner asserts are analogous to applicant’s aeration hood side walls. As such, this figure cannot disclose an apparatus analogous to applicant’s more than one tube within the aeration hood because it fails to disclose any aeration hood comprising at least one open-ended tube distinct from any side wall of the aeration hood as recited in independent claims 10, 22, or 27, or an aeration hood, distinct from a sleeve as recited in independent claim 20.

As none of Cote, Miyashita, or Ide disclose, teach, or suggest either an aeration hood or the sheaths or open-ended tubes recited in any of claims 10-13 or 15-36, no combination of Cote, Miyashita, and Ide could disclose, teach, or suggest each claim element of any of claims 10-13 or 15-36. As such, none of claims 10-13 or 15-36 could be obvious over the asserted combination of Cote, Miyashita, and Ide.

Independent claim 20, as amended, is further patentable over any alleged combination of Cote, Miyashita, and Ide for at least an additional reason. In addition to reciting the claim elements missing from Cote, Miyashita, and Ide discussed above, independent claim 20, as amended, recites in pertinent part “[a] filtration arrangement comprising . . . a sleeve surrounding a periphery of . . . at least one membrane module . . . and having an open region adjacent to a lower end of the at least one membrane module[, and] an aeration hood, distinct from the sleeve [including] at least one aeration opening in a wall of the aeration hood positioned adjacent to the open region, the aeration hood constructed and arranged to direct a gas through the at least one aeration opening and into an interior of the sleeve through the open region upon displacement of the feed liquid in the aeration hood.” As discussed above, neither Cote nor Ide disclose any aeration hood. Miyashita does not disclose, teach or suggest any sleeve surrounding the membrane modules disclosed or at least one aeration opening in a wall of an aeration hood (alleged by the Examiner to include walls 106 and 106a) distinct from any such sleeve and positioned adjacent to an open region in any such sleeve. Thus, independent claim 20 further patentably distinguishes over the alleged combination of Cote, Miyashita, and Ide.

Independent claim 22 is further patentable over any alleged combination of Cote with Miyashita and Ide for at least an additional reason. In addition to reciting the claim elements missing from Cote, Miyashita, and Ide discussed above, independent claim 22 recites, in pertinent part, “passing the gas through the aeration inlet [formed in a wall of an open-ended tube at a location spaced from an upper end thereof] into a volume enclosed by the open-ended tube.” Open-worked zones 8, 8a in FIG. 9 of Cote are not aeration inlets formed in a wall of an open ended tube as is asserted by the Examiner in paragraph 37c of the Office Action. Cote cannot disclose passing an aerating gas through aeration inlets in tubes which are both open-ended and which include aeration inlets in walls thereof. If ozone enters sheath 5a through the lower open-worked zone 8, and if sheath 5a was open-ended, this open-worked zone cannot be an aeration inlet in a wall of an open-ended tube because the wall of the sheath 5a terminates where the open-worked zone begins. If the open-worked zones 8, 8a were to be considered part of the wall of

sheaths 5, 5a, then sheaths 5, 5a could not be considered open-ended tubes because they are disclosed as capped on each end at the termination of open-worked zones 8, 8a.

Ide cannot disclose “passing the gas through the aeration inlet [formed in a wall of an open-ended tube at a location spaced from an upper end thereof] into a volume enclosed by the open-ended tube” either. Ide discloses vent holes 18 in tube 4, but these vent holes are utilized to pass gas from the inside of the tube outward, not “into a volume enclosed by the open-ended tube.”

Independent claim 27 is also further patentable over any alleged combination of Cote with Miyashita and Ide for at least an additional reason. Cote, Miyashita, and Ide all fail to disclose any open-ended tube distinct from any side wall of an aeration hood, and having an open end sealingly secured to an upper wall of an aeration hood at an opening in the upper wall, a membrane module disposed within the tube, the tube extending part way along the length of the membrane module and defining an open region adjacent the lower end of the membrane module, the membrane module in fluid communication with the water to be treated through the opening in the upper wall, as recited in independent claim 27, as amended. Cote describes sheaths 5, 5a secured to a lower wall 9 of a filtration chamber, not to any upper wall of any aeration hood, and neither Miyashita nor Ide disclose any open-ended tubes distinct from any side wall of an aeration hood whatsoever, let alone open-ended tubes having open ends sealingly secured to an opening in an upper wall of an aeration hood. Miyashita cannot disclose or render obvious an upper wall of an aeration hood at all, for the reasons discussed above.

Further, one of skill in the art would not have combined Cote with Miyashita and Ide in a manner that resulted in an open-ended tube distinct from any side wall of an aeration hood sealingly secured to an upper wall of an aeration hood, as recited in independent claim 27, because this would have rendered the apparatus of Cote inoperable. If such a modification to Cote were to have been made there would then be no upper open-worked zone 8 in the sheath 5a to act as a return path for circulating liquid to be treated as illustrated in Cote FIG. 10.

Even further, Cote, Miyashita, and Ide all fail to disclose an open-ended tube extending part way along the length of the membrane module to define an open region

adjacent the lower end of the membrane module. Miyashita does not disclose any open-ended tube distinct from a sidewall of an aeration hood for the reasons discussed above. Ide does not disclose any open ended tube defining an open region adjacent the lower end of a membrane module because the tube of Ide extends past the bottom of the enclosed membrane module. Open-worked zone 8 of Cote is not an open region. Rather open-worked zone 8 is defined by a structure, illustrated in Cote as lines connecting portions of sleeve 5a, which confines membrane module 14 contained therein.

In addition to there being no *prima facie* case of obviousness of claims 10-13 and 15-36 over Cote in view of Miyashita and further in view of Ide due to these references failing to disclose, teach, or suggest each and every element of any of these claims, there is no *prima facie* case of obviousness of claims 10-13 and 15-36 over Cote in view of Miyashita and further in view of Ide because these references could not have been validly combined. One of ordinary skill in the art would not have been motivated to have combined Cote with Miyashita or with Ide in the manner suggested. These three references are directed to fundamentally different and discreet filtration devices, each having specific goals, structures, and methods of operation. The Examiner appears to have used hindsight reasoning as a roadmap to pick, choose, and combine various discreet elements of these three references. The Examiner has not provided a valid rationale as to why one of ordinary skill in the art would have modified Cote to include features of Miyashita or Ide in the manner asserted. To the contrary, one of ordinary skill in the art would have been dissuaded from modifying Cote to include features of Miyashita and/or Ide in the manner asserted for the reasons outlined below.

None of the Examiner's alleged motivations for combining Cote with Miyashita and Ide are valid. One of ordinary skill in the art would not have looked to Cote, Miyashita, and Ide and combined them as asserted in the Office Action because such a combination would have increased the complexity, size, and cost of the filtration device of Cote while providing no additional benefit.

One of skill in ordinary skill in the art would not have been motivated to have combined Cote with Miyashita in the manner asserted because the membranes of Cote are already surrounded by sheaths 5, 5a. Sheaths 5, 5a of Cote serve guide and confine



ozone provided by ozone distribution system 6, 15 introduced into the sheaths about the membrane modules located within the sheaths. Surrounding the sheaths with an additional housing, such as sidewalls 206 or 220 of Miyashita would serve no purpose. This would only have increased the size, footprint, complexity, and cost of the filtration system according to Cote and provided no benefits to the system. This would have been counter to one of the recited aims of Cote – to provide a reduced size filtration apparatus (Cote at Col. 2, lines 3-9 and 24-28). To provide an additional housing about sheaths 5, 5a would not have served to further guide gas toward membrane modules in sheaths 5, 5a as asserted by the Examiner. According to Cote, ozone aeration bubbles are introduced only internal to sheaths 5, 5a and are retained about the membrane modules by sheaths 5, 5a. Sheaths 5, 5a would have isolated membranes contained therein from any aeration bubbles that would have been introduced into an area defined by sidewalls 206, 220 of Miyashita but outside sheaths 5, 5a, thereby defeating the purpose of Miyashita's sidewalls 206, 220.

One of ordinary skill in the art would not have been motivated to have combined Ide with Cote in the manner asserted because this would have fundamentally altered the structure and operation of the filtration apparatus of Cote without offering any benefits. As discussed above, the sheaths 5, 5a of Cote already serve to guide and confine ozone provided by ozone distribution system 6, 15 about the membranes enclosed within sheaths 5, 5a. There would be no reason or need to invert these tubes to be connected to an upper plate as in Ide instead of a lower wall as in Cote to achieve confinement and guidance of the ozone. Further, doing so would require a fundamental redesign to the filtration apparatus of Cote, including redesigning the filtrate recovery and ozone delivery sub-systems and the methods of operation of these sub-systems as well as designing a different mechanism for floated material removal. A proposed modification to a reference that fundamentally alters the nature or function of the subject of that reference is improper. (*See* MPEP § 2143.01 VI, “If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).”)

One of ordinary skill in the art would also have not been motivated to have

combined Ide with Miyashita. Tube 4 of Ide appears to confine bubbles introduced therein within the tube and guide the bubbles along the membranes 2 without the need for any further confinement means. The addition of Miyashita's sidewalls 206, 220 about tube 4 of Ide would only increase the size, footprint, complexity, and cost of the filtration system according to Ide and provide no benefits to the system.

Thus, no *prima facie* case of obviousness of independent claims 10, 20, 22, and 27 can be made over Cote in view of Miyashita and further in view of Ide. Any alleged combination of Cote with Miyashita and Ide would have lacked at least one explicitly recited claim element in each of independent claims 10, 20, 22, and 27. For example, none of these references, alone or in combination disclose, teach, or suggest either an aeration hood or the sheaths or open-ended tubes recited in any of claims 10-13 or 15-36. Further, Cote, Miyashita, and Ide cannot be validly combined because one of ordinary skill in the art would have had no motivation to combine them.

Accordingly, reconsideration and withdrawal of the rejection of independent claims 10, 20, 22, and 27 under 35 U.S.C. § 103 as being unpatentable over Cote in view of Miyashita and further in view of Ide is respectfully requested.

Dependent claims 11-13, 15-19, and 35 depend from independent claim 10 and are patentable over Cote in view of Miyashita and further in view of Ide for at least the same reasons as independent claim 10. Dependent claim 21 depends from independent claim 20 and is patentable over Cote in view of Miyashita and further in view of Ide for at least the same reasons as independent claim 20. Dependent claims 23-26 and 36 depend directly or indirectly from independent claim 22 and are patentable over Cote in view of Miyashita and further in view of Ide for at least the same reasons as independent claim 22. Dependent claims 28-34 depend directly or indirectly from independent claim 27 and are patentable over Cote in view of Miyashita and further in view of Ide for at least the same reasons as independent claim 27. Accordingly, reconsideration and withdrawal of the rejection of dependent claims 11-13 and 15-19, 21, 23-26, and 28-36 under 35 U.S.C. § 103 as being unpatentable over Cote in view of Miyashita and further in view of Ide is respectfully requested.

**CONCLUSION**

In view of the foregoing Amendments and Remarks, this application is in condition for allowance; a notice to this effect is respectfully requested. If the Examiner believes that the application is not in condition for allowance, the Examiner is requested to call Applicant's attorney at the telephone number listed below.

If this Response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this Response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50/2762. (Ref. No. M2019-7023US)

Respectfully submitted,  
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